Technical Service & Training Policies and Procedures

June 2012 ver 1.02

CUSTOMER SERVICE IS OUR PASSION

The intent of this booklet is to guide our customers on how to best utilize the resources of our Technical Support and Training staff. Please don't hesitate to contact us with any questions you might have regarding the services we offer.

Table of Contents

Click on any selection below to be taken to that page. Return to Table of contents by clicking on any page heading

Supporting Documents

Training Course Cancellation Policy: We encourage people to sign up online for courses and to do so early to insure a seat is reserved in their name. Please note that we reserve the right to cancel a course at least one week in advance when attendance is below our minimum, which changes based on subject matter and length of class.

Training Course No Shows: There are significant costs incurred to produce a training course, including printing, travel, lodging, meals, snacks and drinks. Please note that no shows, those who sign up for courses, but don't show up or cancel within 24 hours of the scheduled start time are billed the full tuition. All handouts will be provided to the TM for delivery to the contractor as time permits.

Technical Service Group – Introduction

Our mission is to provide the best technical support and training of any distributor in the country, bar none. We constantly strive to meet that goal and welcome your feedback on any improvements we can make. The technical service team consists of the following highly motivated and skilled employees:

- **Jack Bartell – Director of Technical Services**
  Office 804-608-3610 Cell 405-664-2075 jackbartell@virginiaair.com
- **Alan Dukes - Technical Service Manager**
  - Virginia Region, based in Richmond

  Office 804-379-1610 Cell 804-640-4090 alandukes@virginiaair.com
- **Don Stanley – Technical Service Manager**
  - Virginia Region, based in Chesapeake

  Office 757-436-2939 Cell 757-309-7741 donstanley@virginiaair.com
- **Juan Cardona – Technical Service Manager**
  - Virginia Region, based in Nitro. Also supports the Roanoke Branch

  Office 304-722-7500 Cell 304-389-7566 juancardona@virginiaair.com
- **Bruce Persinger – Technical Service Manager**
  - NC Region, based in Charlotte. Also supports the Ashville and Salisbury Branches

  Office 704-599-1933 Cell 704-577-2869 brucepersinger@virginiaair.com
- **Josh Bradshaw – Technical Service Manager**
  - NC Region, based in Greensboro. Also supports the Raleigh Branch

  Office 336-668-9240 Cell 336-623-4350 joshbradshaw@virginiaair.com
- **Mike Beiler – Technical Service Manager**
  - TS Region, based in Columbus. Also supports the Cincinnati Branch

  Office 614-262-1129 Cell 614-506-5560 mikebeiler@virginiaair.com
- **Bradd Best – Technical Service Manager**
  - TS Region, based in Pittsburgh. Also supports the Cleveland Branch

  Office 724-266-2020 Cell 304-491-7873 braddbest@virginiaair.com

Note: A short bio and picture of each TSM can be found on our Technical support homepage:
http://www.virginiaair.com/technicalservicesupport.php

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Online Resources

The following online resources have been developed for use by our customers and employees. These links and documents are updated and expanded on a very regular basis, so please visit them often.

- **TSM Availability** - We strive to give our customers the greatest access to the Virginia Air technical support team. As such we publish our daily schedules online so you'll always know who is in the office. We are committed to having at least 3 TSM's on the phones at all times during normal business hours. However during times of extreme cold or heat the ability of the TSM to leave the office for site visits is limited so we can have more support on the phones.
  http://www.virginiaair.com/tsm_availability.php

- **View Available Forms** – This link provides an area to download a wealth of critical items we feel are of vital interest to our contractors. These items include start up sheets, wiring diagrams, performance data, a line sizing spreadsheet, troubleshooting guides and other valuable documents. No password or login ID required for this page.
  http://www.virginiaair.com/technicalservicesupport.php?section=forms

- **View Service Letters** – This link provides access to service letters and service tips published by York and Virginia Air. Many times these letters can help a technician understand a problem they've faced with a specific unit. The list changes often and can be sorted or viewed in a variety of ways. Access to this material is limited to our contractors. To view these materials you must first enter the login ID (**vaairdealer**) and the password (**dealer**).
  http://www.virginiaair.com/serviceletters.php

- **Customer Video Access** – This link provides access to the video area of our website where you can view technically oriented videos with a wide range of subject matter such as NATE preparation, brazing micro-channel coils, furnace pressure switch troubleshooting, using Wrightsoft load calculation and duct sizing. New titles are added regularly and we'd like your feedback as to what videos you use to help your business grow. Use the same login ID and password as above.
  http://www.virginiaair.com/dealervideos.php

- **View Upcoming Classes** – This link provides an area where customers can view the schedule of upcoming technical and business classes. Using a search function or dropdown box you can narrow the classes shown to a specific topic or branch. Customers can also see how many seats are available as well as sign up for classes to reserve a seat.
  http://www.virginiaair.com/classes.php

- **Anytime Learning Network** – Virginia Air was among the first distributors in the country to offer online technical training. This link provides access to the list of ALN online courses, a means to sign up for any of the courses and direct access to the online campus.
  http://www.virginiaair.com/aln.php

- **Online Tools** – These online tools can be accessed by purchasing a subscription. The tools currently include load calculation, duct sizing, energy analysis, superheat and subcooling calculations and others, all usable from a standard computer, tablet or smart phone. Contact your territory manager for details on purchasing a subscription. Multiple user discounts are available so don't hesitate to call us for details on these valuable and useful tools.
  http://hvacwebapps.com/apps/va-air/

Technical Service Calls

One of the primary job functions for a technical service manager (TSM) is to assist our customers in solving problems over the phone. Our minimum number of TSM's on the phones is three, however during extreme weather such as very high or very low temperatures we will increase the number of available TSM's in anticipation of increased call activity.

When seeking technical support you can simply call your local branch and ask for the TSM. Alternately you can look to our TSM availability screen to see which of our TSM's are in the office and ready to take your call. Depending on who is available your first choice should always be the TSM responsible for the branch from which you purchase product, however if that person is not showing available select the next TSM in your region. If no one is available from your region on a particular day always feel free to contact any of the remaining TSM's.

We attempt to document all incoming technical support calls. The records we keep are then used to identify trends in service or warranty, allowing us to be proactive in reporting back to York's technical support department. It also helps technicians obtain more accurate support if they call back with follow up information but get connected with a different TSM who can instantly bring up the record of the earlier support call.

So prior to making the call and as a way to increase the likelihood the TSM can help resolve your issue please have the following information at the ready:

- Technician contact information such as first/last name, company name, company phone and cell phone
- Model and Serial # (both indoor and outdoor if split system)
- Date Installed and date failed
- Description of the problem, including as many specifics as possible
- Temperatures, pressures and all operational data that may assist the TSM in finding the resolution

In fact, to better serve you we recommend having a diagnostic or start up sheet completed **prior** to making the call. We have sheets for residential and/or commercial A/C and heat pumps, ground source heat pumps, mini split systems and gas furnaces. These sheets are available to download from our available forms page. Also available to download from that same page is a list of tools we suggest be on every service van. These tools are vital to insuring a professional start up, commissioning or troubleshooting effort. Please don't hesitate to contact us if you have questions on what tools are needed to obtain the data for these sheets.

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TSM Jobsite Visits

Jobsite visits are another valuable service provided by a TSM, with the goal to always resolve issues as efficiently as possible. In order to meet our phone support goals, site visits must be scheduled with as much advance notice as can be provided and we ask that you keep in mind only the Regional Vice President, TSM or the Director of Technical Service can schedule a site visit. A service technician with all the tools needed to perform the work must be present for any site visit. If the site visit will not involve troubleshooting a system another contractor representative, such as a principle or manager, may be present instead of a service technician. However there must always be a contractor present when a TSM visits a site. NO EXCEPTIONS to this rule are permitted under any circumstances.

Site visits can only be made if the TSM has received, in advance, a completed datasheet. The reason behind this requirement is that it is a well proven fact that our TSM's resolve most service and troubleshooting issues from their desks when provided the proper information. The data found on our start up or diagnostic sheets help them get to the core of the problem quickly. By requesting and reviewing this information before considering a site visit they often spot the problem and provide suggested resolutions without having to leave the office. This information is also required by the factory when we contact them for additional support. An urgent call because a service technician has been to the site 5 times is not as effective as if we are called to assist after the first or second visit. Even if a site visit is not required at that time we can log the information then have it available as reference data at a later time if more action is required.

Please help us support you in the most proactive way possible by following the steps below to arrange a site visit:

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- Provide the TSM with the completed data sheet using fax or email. After entering the data into our call log, reviewing and discussing it with the technician, the TSM may provide suggestions on how to resolve the issue. If the suggested resolutions do not resolve the problem a site visit can then be scheduled.
- The TSM will schedule the visit at a time most convenient with the system owner and the contractor, with the only limiting factor being the need to insure our minimum phone coverage is met.
- The TSM will meet the contractor at the jobsite at the designated date and time. The TSM provides supervisory assistance onsite and also records all the data. The technician must have the tools required to complete all anticipated troubleshooting tasks. These tasks may include, but are not limited to, the ability to recover the system charge into a clean empty cylinder, weighing the charge that was removed, evacuating the system to 500 microns and weighing in the correct, calculated charge. For details on the tools we recommend every service van have (or have access to), please see appendix G.
- After the site visit the TSM will forward, via email or fax, a report to the contractor detailing the suspected cause, resolution and follow up recommendations. All jobsite notes and reports are then entered into our call log.

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DOA Policy

The intent of the Virginia Air Dead On Arrival (DOA) policy is to insure consumers and contractors are not forced to accept one of the few units that may come from the factory with a problem that can either not be repaired, or due to concerns for long term reliability, a repair is not an option. *This policy is limited to contractors who participate in the Freedom or Patriot programs and who also attend the product training courses.* Please see your TM to discuss eligibility.

The acronym DOA means dead on arrival so the failure must occur within 30 days of the unit start up to qualify for this program. Failures that occur beyond the first 30 days would be covered by either the factory CCE program or the unit's standard warranty. Please contact your territory manager or your local TSM to verify coverage. The program guidelines are as follows:

- *Authorization for any unit being returned under this policy must be obtained in advance from a regional vice president, branch/operations manager or technical service manager*.
- The policy only applies to residential condensing units, furnaces and residential packaged units.
- To qualify the failure must be a non-repairable refrigeration leak, a shorted, open or non-repairable compressor or a defective, non-repairable heat exchanger.
- To begin the process call the branch TSM or any TSM on call to report a unit being DOA. Provide model/serial of the unit along with the reason for failure.
    - The reason for failure must be specific. "Compressor will not start" or "The unit has a leak" will not be considered specific enough to qualify.
- The TSM will log the information and then provide you with a SR# for future reference. The words "DOA SR#" should then be written on the unit being returned to insure proper tracking.
    - Units received without an SR# for tracking cannot be accepted by our warehouse staff or truck drivers.
- A completed residential start up/data sheet must be provided on the replacement unit. This insures the new unit is operating within acceptable parameters.
    - **Note:** Credit for either the unit or the unit and labor (if applicable) are not issued until the completed startup/data sheet has been received by the TSM responsible for the branch where the unit was purchased. This information is then scanned and attached to the service request (SR) in our call log for future reference.

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Technical Training

One of the universal truths about the HVAC industry is that it is constantly evolving and improving. So to keep pace with the introduction of new products and technologies it is absolutely essential for contractors and technicians to evolve and improve as well. Virginia Air takes pride in offering our customers the widest range of technical training opportunities in the industry. Our jobs and lives are typically very busy so making time for training can be a challenge. A contractor will sometimes say "What if I train that technician and he leaves the company?" We'll always counter by suggesting they ask a different question: "What if I don't train that technician and he stays?". Listed below is a list of our current training options:

Traditional Classroom Training

F2F or Face to Face training has existed since the dawn of time and continues to be the method of choice for a large contingent of contractors and technicians. Last year we developed and introduced a five part series called "C.A.T." or Callback Avoidance Training. It was very successful and continues as a popular offering for both seasoned and new technicians. We offer a wide range of scheduled training courses in both spring and fall. However please keep in mind that posted courses are added and changed on a very regular basis so we encourage you to visit our webpage often.

Anytime Learning Network

We understand how difficult it can be to juggle work, home, training and still find a way to enjoy some leisure time. So Virginia Air was among the first distributors in the country to offer online technical training. Our ALN offers almost 40 full length training courses that take anywhere from 15 to 25 hours to complete. These courses are used by colleges and universities across the country in a wide range of content such as HVACR Fundamental, Electrical Theory (both AC & DC), Oil Heat, Gas Heat, Heat Pumps, Indoor Air Quality, Troubleshooting, etc.. The courses are rated as beginning, intermediate and advanced.

Self Paced Training Modules

Through our partnership with Hardi we offer a full range of printed training materials for those learners who prefer self paced home study courses over F2F or online. Many of these courses are designed non technical personnel such as office, accounting or warehouse staff whose productivity and efficiency can be improved with a better understanding of the HVAC industry. The courses come in a wide range of topics that include comfort heating, comfort cooling, controls, materials handling, etc.

Personalized Training Sessions

Whether in response to new hires, when considering a new product line or to simply get up to speed on how to wire a particular system, Virginia Air is there to help. One of our TSM's can come to your place of business at a time most convenient to your schedule to present whatever material you request.

Webinars – Live and Pre-Recorded

Webinars are fast becoming a training tool of choice for many organizations. They can be arranged quickly, require no special travel and very little cost. Yet live webinars, typically less than 1 hour in length, allow learners to interact with the presenter in a way that video cannot, while pre-recorded webinars give potential learners the chance to review material they may not otherwise have access to. If you have a need or idea for a webinar, please don't hesitate to ask as we can arrange the webinar of your choice as soon as time permits.

ProficienTECH Training System

All Virginia Air Freedom, Patriot and Liberties Plus contractors have free, unlimited access to the York ProficienTECH Training System on UPGnet. Here you'll find a wealth of high quality product specific training courses designed to provide you with knowledge on York equipment relative to proper operation, installation and troubleshooting. You'll also find videos formatted for use on your desktop, laptop or mobile device. Many items can be downloaded directly to your mobile device so they can be accessed at anytime. Be sure to ask your Territory Manger or local TSM for information on this valuable training resource.

Frequently Asked Questions (F.A.Q's)

The following are a list of common questions often posed to the technical service managers. We hope you find them useful and would encourage you contact your local TSM or Jack Bartell with any additional questions you might have. We will add to this list from time to time so please be sure to visit our View Available Forms page often to obtain the most recent version of this document.

I would like to call the factory directly for technical support. Why will Virginia Air not provide a number to call? As the local York distributor it's both our responsibility and our desire to support the products we sell. Even if a contractor were to reach out to the factory they will always be redirected back to the local distributor.

I have a consumer who is demanding to speak with the factory. Will Virginia Air provide them a contact number? For the same reasons as mentioned above we do not provide the factory technical support number to consumers. Consumers who try contacting the factory directly will always be redirected back to us as the local distributor. We sell only to licensed contractors who then sell those products to consumers. If a consumer has an issue they should first speak to the installing contractor. However we will always do our best to help resolve issues between a consumer and a contractor and we always try to answer consumer questions.

I have a design or quality issue that I feel should be brought to the factory's attention. How can I get this accomplished? Provide your local TSM with as much detail as you can, including pictures whenever possible. They will complete a "Product Report" which is then submitted to the factory. The York senior leadership team insists that all product reports be reviewed by a team that includes field service, manufacturing engineering and design engineering who must then provide an answer to the person who submits the PR. This insures your voice is heard and we strongly encourage our contractors to use this powerful tool.

How do I determine if the control board or ECM motor is the problem? Verify you have high voltage to the motor and then connect a Tech Mate to the motor. Contact your local VA Air branch to obtain this valuable tool.

How do I check a X13 motor to verify if it's not working properly? Verify you have high voltage constant to the motor and then check to see if you have 24v on one of the terminals 1-5.

On Heat Pumps, why does York send all thermostat outputs to the control board in the outdoor unit first, then back to the air handler? Because all of the logic is built into outdoor defrost board, including the ability to control the backup heat.

I recently replaced a control board on a heat pump, but it won't bring on the compressor and there is no voltage on the M terminal. Why? You must move the defrost curve jumper from P to the correct setting.

After replacing a control board on a gas furnace it constantly displays a reversed polarity/twinning error? This can be resolved by reversing the transformer leads.

Why does York require the model and serial number of the indoor unit when a compressor is replaced? This information is used to ensure the system is an AHRI match. Mis-matched equipment can lead to premature failures and overall customer dissatisfaction.

Why does York install a filter drier in the discharge line of the compressor on some units? This drier, which is an oversized Sporlan solid core drier, helps to maintain the cleanliness of the refrigeration circuit and can also reduce discharge line pulse noise. This drier must be replaced anytime the refrigeration system is opened to the atmosphere with an equivalent drier whose core is rated for the higher heat generated by the discharge gas.

Frequently Asked Questions (F.A.Q's)

Why does York require a "Warranty Compressor Data Sheet" on a unit with multiple compressor failures? It is unusual for a unit to have multiple compressor failures. By completing this sheet it allows us to spot system abnormalities that may be the underlying cause of the compressor failures and in turn provide suggestions to correct those abnormalities, thus preventing future failures.

While working on an Affinity heat pump the control board displayed a fault code. Where can I go to find what it means? Fault code information can be found in the unit's installation instructions. If you don't have them on site it can be downloaded to your smartphone by logging onto http://mobile.virginiaair.com/.

I have a split system application with 128 feet of refrigerant piping. What size line set do I need and what would the refrigerant charge be? You can use the installation instructions along with the long line set application guidelines and our refrigerant line sizing spreadsheet. They can be downloaded from our forms webpage at http://www.virginiaair.com/technicalservicesupport.php?section=forms

I have a gas furnace with a variable speed blower. The cfm light on the board tells me it's delivering 1200 cfm. How can I be sure it is in fact moving 1200 cfm? You can apply the sensible heat formula to quickly and easily determine actual CFM while on the jobsite: *CFM=BTUH/(1.08 X TD)*

How can I be sure I've properly connected the low voltage wiring on a York system? Always follow the wiring diagram provided in the installation instructions that come with the unit. If the instructions are not onsite we have a comprehensive list of most current wiring configurations which can be downloaded from our forms webpage at http://www.virginiaair.com/technicalservicesupport.php?section=forms

How do I set the air flow on an air handler with an X-13 motor? Measure the actual total ESP, then find that value on the blower performance chart for the current speed in the installation instructions. The chart will show you what your current CFM is. Adjust speed and recheck static until you have achieved the proper CFM.

Why doesn't my unit work after replacing the control board? Verify that the jumper pins on the new control board were set to the same values as the old board.

We are installing a York commercial heat pump. Where do I connect the "O" wire from the thermostat to energize the reversing valve? York commercial heat pumps do not require an "O" input which means you must use a conventional thermostat and wire the system accordingly.

Why do so many LED's light up when I retrieve the fault codes on commercial units? On the Simplicity 1A board you can determine the fault code by counting the blinking green LED or by using the sum of the lit green LED's, which many technicians find easier.

Why does the blower run continuously without a call from the thermostat on this York packaged unit? This usually indicates a limit has tripped. On a gas unit the draft inducer may also be running and you may in fact see the gas ignite normally. But the root cause is almost always an airflow issue.

If there is a technician on the jobsite, but he does not have internet capability what number should he dial for technical support? He should place a call to the local Virginia Air Branch. Someone there will look online to see who is available, and then connect the technician to that TSM.

Is there somewhere on the web the technician can go to determine the warranty status of a unit? Yes, they can use the Virginia Air Mobile Site at: http://mobile.virginiaair.com/.

RESIDENTIAL START UP CHECK LIST

Cond. Model #_____ Serial #_____

Evap. Model #_____ Serial #_____

AH/Furn. Model #_____ Serial #_____

Elec. Heat Model #_____ Serial #_____

Owner_____ Phone #_____ Start Up Date_____

Owner Address_____

Installing Contractor_____ Start Up Mechanic_____

- ❑ Check and verify model numbers to insure proper match up
- ❑ Install field accessories as required (Follow accessory installation instructions)
- ❑ If installing a TXV, carefully tighten connections and install/insulate sensing bulb
- ❑ Prior to energizing the system, inspect all factory electrical connections (tighten as needed) and verify field wiring, including accessories.
- ❑ Verify thermostat parameters have been set to jobsite requirements
- ❑ Inspect and set pin selections on air handler, furnace and condensing unit (if applicable)
- ❑ Install primary and secondary drains as per I/O and local codes
- ❑ Install line set, purging with Nitrogen while brazing (Leak check refrigeration system)
- ❑ Evacuate to below 500 microns *(Must stay below 1000 microns for 7 minutes)*
- ❑ Calculate and weigh in refrigerant charge (Refer to application data sheet)
- ❑ *Furnaces:* Leak check all gas line connections, then verify a complete and solid ground exists
- ❑ *Furnaces:* If converting to LP verify the correct kit has been used and installed.
- ❑ *Furnaces:* Measure inlet gas pressure_____ Measure manifold gas pressure_____
- ❑ *All Heating Systems:* Measured Temperature Rise_____ (Adjust airflow as needed)
- ❑ *Refrigeration Systems:* Verify airflow, operate for 15 minutes, then measure/record performance. *If heat pump, operate in both heating and cooling modes*
- ❑ Perform all other start up procedures outlined in the installation instructions and complete the data fields on page 2 of this document
- ❑ Balance system airflow to each room to insure proper distribution
- ❑ Provide owner with information packet, explaining thermostat and system operation

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YORK
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Air Conditioning & Heat Pump Systems

Start-Up Information Sheet

Record the data below as a permanent record the unit is performing as expected on start up.

LL: Pressure_____ Temperature_____ Saturated Temperature_____ Subcooling_____ OD Db Temp_____

SL: Pressure_____ Temperature_____ Saturated Temperature____ Superheat_____ Discharge Temp____
Measured after 15 minutes of run time

Compressor: Type_____ Running Volts_____ Amps (1st Stage)_____ Amps (2nd Stage)_____

Low Voltage: R____ Y1_____ Y2_____ Y2Out_____ O_____ W1_____ W2_____
Measured from Common

Suction Line Size___ Liquid Line Size___ Vertical Rise____ ft. Total Length_____ ft. # of Els___
Is there underground pipe (Y/N)_____ Length underground_____ft. Refrigerant added ____ozs
If line size verification is required, provide configuration drawings. Refrigerant added is for system match and line length beyond 25'

Return Air: db Temp_____ wb_____ Supply Air: db_____ wb_____ ΔT_____
Values must be taken as close to the coil as possible. Wb temps must be recorded to the nearest tenth of a degree

Return Air Static Pressure_____ Supply Air Static Pressure_____ Total Static_____
Taken downstream of filter for return and upstream of coil for supply (unless a single piece air handler)

CFM_____ Calculation Method: Temp Rise_____ Velometer_____ ECM Board Settings_____

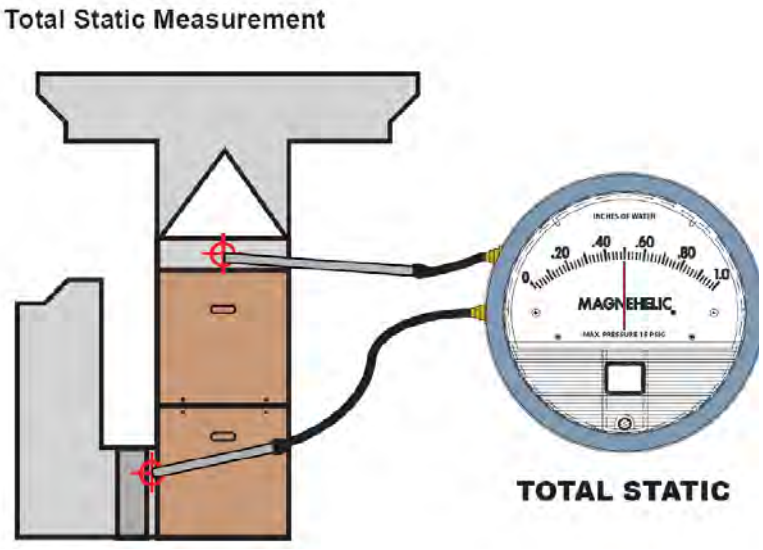
ECM Jumper Settings: Cool_____ Adjust____ Heat_____ Delay_____ Hum_____ HP_____

Other Air Handler, Defrost Control or Furnace Jumper Settings:_____

Comments_____

_____

_____



Heat Pump Diagnostic Information (Please complete both pages)

Circle One

Heat Mode

Cool Mode

Saturation Temp.

Low PSIG

Saturation Temp.

High PSIG

Saturation Temperature is Pressure Converted to Temp.

Super Heat

_____ Vapor Line Temp.

___ _____ Minus Sat Temp.

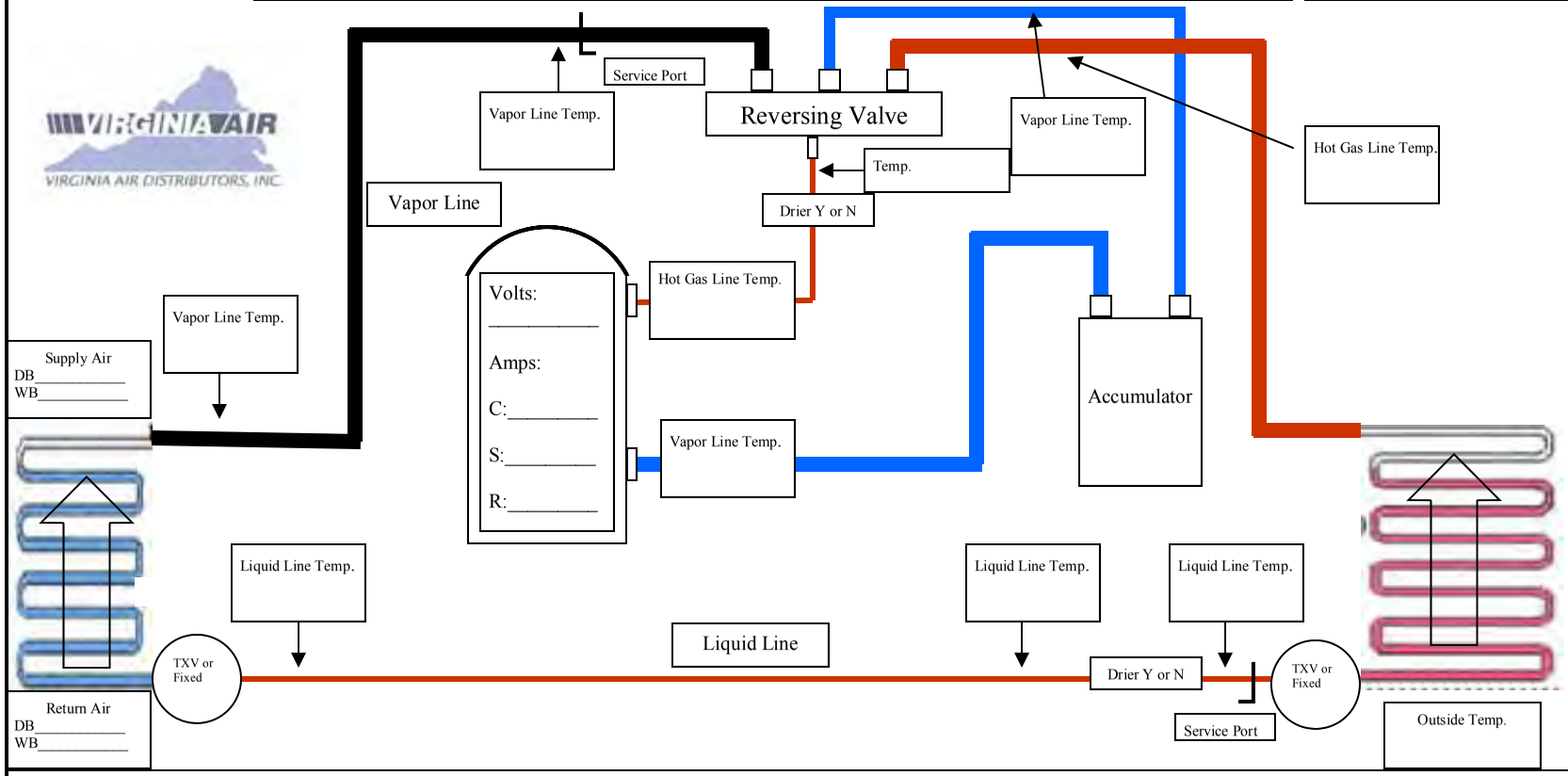
_____ Equals Super Heat

Sub Cooling

_____ Sat Temp.

___ _____ Liquid Line Temp.

_____ Equals Sub Cooling



Air Flow Formula Single Phase: Volts _____ X Amps _____ X 3.413 = Btu _____

Supply Air Temp _____ Minus Return Air Temp. _____ Equals TD _____

$$\frac{\text{BTU}}{\text{TD} \times 1.08} = \text{CFM}$$

Appendix B

Heat Pump Diagnostic Information (Please complete both pages)

Contractor _____Phone_____ Technician _____Date _____

Consumer _____ Address _____

Outdoor Unit Model# _____Serial# _____ Installed _____

Air Handler/Coil # _____ Serial # _____ Metering Device/Size___

Furnace Model# _____ Serial# _____ Fuel Type _____

Low Voltage* R _____ Y1 _____ Y2 _____ O _____ W1 _____ W2 _____ G _____
*Measured From Common

Suction line Size _____ Liquid Line Size _____ Total Length _____ # of Ells _____ Underground Y/N ___

Is Evaporator Above or Below Condenser___ Net Vertical Separation Ft' _____

Return Static (*Downstream of air filter) _____ Supply Static (*Upstream of Evaporator coil) _____ Total Static _____
*Unless integral to the unit (such as an air handler) where such pressure loses are included in the blower performance tables

If a PSC Blower, What Is The Blower Speed: In Cooling ___ In Heating ____

If a ECM Blower, List Jumper Settings For: Cool _____ Adjust _____ Heat _____ Delay _____ Hum _____

List Pin Settings for the Defrost board and/or Furnace board_____

Notes: **Always start by checking the indoor air flow**. The air flow across an evaporator must be known *before* taking refrigeration pressures & temperatures or they may not have any real value. A furnace must be running continuously for 15 minutes prior to taking temperature rise. Take supply temperature readings out of direct line of sight from either electric heater or heat exchanger. If other methods are used to determine the cfm please supply detail of how it was calculated.

Job Notes:

_____

_____

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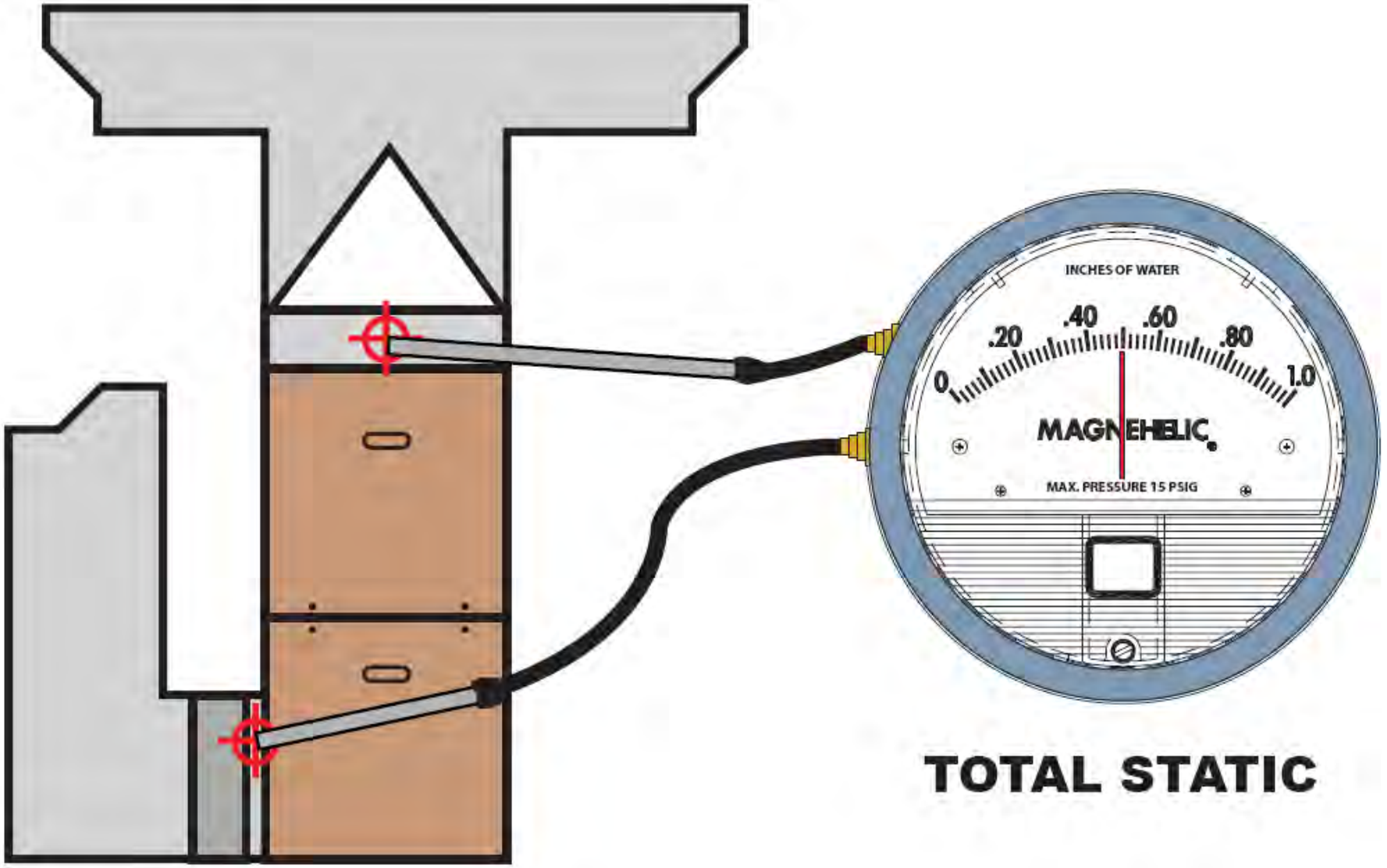
Total Static Measurement



COMMERCIAL START UP CHECK LIST

Outdoor Model #_____ Serial #_____

Indoor Model #_____ Serial #_____

Accessory Model #_____ Serial #_____

System Owner_____ Phone #_____

System Address_____

Installing Contractor_____ Phone# _____Cell# _____

Start Up Technician_____ Cell #_____ NATE ID #_____

Controls Company_____ Contact_____ Phone #_____

- ☐ Inspect the unit for transit damage and report any damage on the carrier's freight bill.
- ☐ Check model number(s) to match invoice and jobsite voltage/application requirements.
- ☐ Install field accessories as required, following installation instructions provided with accessory.
- ☐ Prior to energizing the unit inspect all factory/field electrical connections and tighten as needed.
- ☐ Verify field wiring, including accessories and all multi-tap transformers for correct voltage settings.
- ☐ Install drain trap(s), including secondary drains and traps required by local and/or national codes.
- ☐ Verify belt tension, belt/pulley alignment and check all set screws for proper tightness.
- ☐ Power the unit. Bump the motor starter and outdoor contactor to check rotation. Three phase compressors and motors should be synchronized at the factory but must still be verified.
- ☐ If equipped with gas heat, measure incoming gas pressure to insure supply pressure does not exceed ½" wc. If propane verify gas valve and orifices have been properly converted (if required)
- ☐ If equipped with Simplicity board(s), check and clear fault code history.
- ☐ If third party controls are involved, verify wiring and sequence of operation prior to powering system
- ☐ If split system insure factory or field supplied dryers have been installed properly, evacuate to below 500 microns, then weigh in refrigerant charge based on line size/length and factory required charge.
- ☐ Fill in the Start Up Information as outlined on the opposite side of this sheet.
- ☐ Perform all start up procedures outlined in the installation manual shipped with the unit.
- ☐ Provide owner with information packet. Explain the thermostat and unit operation.

VIRGINIA AIR
VIRGINIA AIR DISTRIBUTORS, INC.

YORK®
It's Time to Get Comfortable™

START UP INFORMATION SHEET

VOLTAGE READING

Outdoor Standing/Running Voltage L1-L2_____/_____ L1-L3_____/_____ L2-L3_____/_____

Indoor Standing/Running Voltage L1-L2_____/_____ L1-L3_____/_____ L2-L3_____/_____

Secondary Voltage_____ C to G Volts*****_____ C to Y1*****_____ C to Y2*****_____

***With thermostat calling**

AMPERAGE READNGS - OUTDOOR

*Compressor Rated Amps*_____ *Cond Fan Rated Amps*_____

Comp #1 L1___ L2___ L3___ Comp #2 L1___ L2___ L3___

Comp #3 L1___ L2___ L3___ Comp #4 L1___ L2___ L3___

Cond Fan #1____ Cond Fan #2____ Cond Fan #3____ Cond Fan #4____

AMPERAGE READINGS – INDOOR

Evaporator Motor: Nominal HP_____ Rated Amps_____ Running Amps_____

Power Exhaust Motor: Nominal HP_____ Rated Amps_____ Running Amps_____

AIRFLOW

Design CFM_____ Dry coil Pressure Drop_____ Calculated CFM_____

TEMPERATURE READINGS

Ambient Temp_____ Return Air db Temp*****_____ Supply Air db Temp*****_____

Return Air wb Temp*****_____ Supply Air wb Temp*****_____

*** Measure after 15 minutes of compressor run time as near to evaporator coil as is practical**

REFRIGERATION SYSTEM

System 1 Suction Pressure_____ Suction Temperature_____ Superheat_____

Discharge Pressure_____ Discharge Temperature_____ Subcooling_____

System 2 Suction Pressure_____ Suction Temperature_____ Superheat_____

Discharge Pressure_____ Discharge Temperature_____ Subcooling_____

SPLIT SYSTEMS

Suction Line Size_____ Liquid Line Size_____ Number of Elbows_____

Cond. above or below the Evap?___ Vert. Line length____ Hoz. Line length____ Total____

Have any other accessories been added (sight glass, strainer)_____

Amount Of Refrigerant added to System1_____ System 2_____

GAS HEAT SYSTEM

Natural or Propane (N or P)___ Propane Kit Installed (Y/N)_____ Orifice Size Used_____

Incoming Gas Pressure_____ Manifold Pressure GV1____ Manifold Pressure GV2____

Temperature Rise* (at high-fire)_____ Temperature Rise* (at low-fire)_____

***Measure after 15 minutes of run time, with supply and return temperatures taken close to the unit**

PRE START UP CHECK LIST

Requested Start Up Date(s)_____

Jobsite Name _____Contact_____

Jobsite Address_____ Phone_____

Installing Contractor_____ Contact_____

Installing Contractor Address_____ Phone_____

Start Up Technician Name_____ Cell Phone_____

Controls Contractor_____ Contact_____

Controls Contractor Address_____ Phone_____

Air Balance Contractor_____ Contact_____

Air Balance Contractor Address_____ Phone_____

Number of units to be started____ Unit Control Package_____ Front End Protocol_____

- ❑ Units have been verified as to correct nomenclature and voltage
- ❑ Curbs have been set and measured to be proper dimensions
- ❑ Units have been set using six point lift with spreader bars
- ❑ Power Wiring has been run to each unit
- ❑ Control wiring has been run to each unit
- ❑ Network wiring has been run to each unit (if applicable)
- ❑ If VAV system, control wire required to force boxes open has been run
- ❑ If VAV system the duct and building static pressure tubing has been run as per I/O
- ❑ Required CFM for each unit is known *(pulley changes required to match airflow are not covered by warranty)*
- ❑ The controls and/or air balance contactor will have a technician on site (if applicable)
- ❑ Factory or distributor personnel are on site in a supervisory capacity and the contractor is required to a have technician with tools and meters on site at all times.

This form must be completed and faxed to the VA Air TSM prior to their arrival on the jobsite. Failure to insure these items have been completed prior to start up will result in delays and additional charges

Contractor Signature _____ Date Submitted_____

Commercial Equipment, Controls, and Networking Policy

To insure the highest level of support for the York commercial equipment referenced on this quote, submittal, purchase order or invoice, please be aware of the following:

- The protocol in the Simplicity family of controls, standard in most York commercial equipment, is ModBus RTU. While compatible with ModBus RTU front end packages, some changes to registers, drivers, and/or data points may be required. ***Costs associated with these changes are not covered under warranty by either York or Virginia Air.***
- Some third party gateways (or translators), which allow a Simplicity equipped unit to communicate with other network protocols and front end software packages, can be factory installed. The factory, and Virginia Air as their distributor, can only support the Modbus RTU side of the network. Depending on the protocol or front end software being applied to the gateway, some changes to registers, drivers, and/or data points may be required. ***Costs associated with these changes are not covered under warranty by either York or Virginia Air.***
- Simplicity Linc is a gateway designed by JCI to allow the Simplicity family of controls to communicate with a BAcnet MS/TP front end. The factory, and Virginia Air as their distributor, can only support the Modbus RTU side of the network. However some changes to registers, drivers, and/or data points may be required. ***Costs associated with these changes are not covered under warranty by either York or Virginia Air.***

Factory Authorized Equipment Start Up Requirements

To insure any unit can perform as designed, while delivering its expected capacities for its full life cycle, it must be applied, installed, started (or commissioned) and maintained as per factory guidelines. Virginia Air sells all York equipment with the expectation that the units will be installed, started and maintained by a technician qualified to perform such tasks. Please be aware of the following:

- As per York's factory warranty policy, Millennium packaged units *MUST* be started by a technician having previously attended a two day factory authorized seminar, passing the exam with a grade of 70% or higher.
- A completed start up form must be faxed (804-608-3099) or emailed to Jack Bartell (jackbartell@virginiaair.com). This form will be reviewed for accuracy, then be forwarded to the factory.
- Units not started by a factory authorized technician will have all DOA labor denied and may have, at the factory's discretion, all part warranties denied as well. These actions are designed to protect all parties, particularly the end user.
- When requested, Virginia Air can provide supervisory start up assistance for all York products at a cost of $950 per day (plus expenses). The amount of time required is based on the number of units being started, as well as the type of units, with an estimate provided on a per job basis. This service is supervisory in nature meaning the contactor is required to supply a service technician with tools and meters. A completed and signed Pre-Start Up Checklist must be on file prior to the actual start up taking place.
- Air balance of York Equipment is NOT included in warranty or start-up costs. Drive sheave calculations, adjustments, or replacements required to match measured CFM to specified CFM are the responsibility of the installing contractor.

Additional Items Which May Have An Effect On Equipment Warranty

- Extended protection plans, sold with equipment as part of the original sale or purchased after the sale within the allowable time frame, will not be submitted to the factory (and as such will not be considered in effect) unless a completed start up form is on file.
- Completed extended protection plan forms must be submitted to Virginia Air by the contractor who purchases the equipment. Neither Virginia Air nor the factory can be held accountable for plans which are purchased, but for which no registration forms are submitted.
- If equipment is purchased by one contactor then sold, started, or commissioned by another contractor, it is the responsibility of the contractor to whom we sold the equipment to insure all subsequent parties are aware of these policies.

CLIMATEMASTER TROUBLESHOOTING

General
If operational difficulties are encountered, perform the preliminary checks below before referring to the troubleshooting charts.
- Verify that the unit is receiving electrical supply power.
- Make sure the fuses in the fused disconnect switches are intact.

After completing the preliminary checks described above, inspect for other obvious problems such as leaking connections, broken or disconnected wires, etc. If everything appears to be in order, but the unit still fails to operate properly, refer to the "CXM Troubleshooting Process Flowchart" or "Functional Troubleshooting Chart."

CXM Board
CXM board troubleshooting in general is best summarized as simply verifying inputs and outputs. After inputs and outputs have been verified, board operation is confirmed and the problem must be elsewhere. Below are some general guidelines for troubleshooting the CXM control.

Field Inputs
All inputs are 24VAC from the thermostat and can be verified using a volt meter between C and Y, G, O, W. 24VAC will be present at the terminal (for example, between "Y" and "C") if the thermostat is sending an input to the CXM board.

Sensor Inputs
All sensor inputs are 'paired wires' connecting each component to the board. Therefore, continuity on pressure switches, for example can be checked at the board connector.

The thermistor resistance should be measured with the connector removed so that only the impedance of the thermistor is measured. If desired, this reading can be compared to the thermistor resistance chart shown in the CXM/DXM AOM manual. An ice bath can be used to check calibration of the thermistor.

Outputs
The compressor relay is 24VAC and can be verified using a voltmeter. The fan signal is passed through the board to the external fan relay (units with PSC motors only). The alarm relay can either be 24VAC as shipped or dry contacts for use with DDC controls by clipping the JW1 jumper. Electric heat outputs are 24VDC "ground sinking" and require a volt meter set for DC to verify operation. The terminal marked "24VDC" is the 24VDC supply to the electric heat board; terminal "EH1" is stage 1 electric heat; terminal "EH2" is stage 2 electric heat. When electric heat is energized (thermostat is sending a "W" input to the CXM controller), there will be 24VDC between terminal "24VDC" and "EH1" (stage 1 electric heat) and/or "EH2" (stage 2 electric heat). A reading of 0VDC between "24VDC" and "EH1" or "EH2" will indicate that the CXM board is NOT sending an output signal to the electric heat board.

Test Mode
Test mode can be entered for 20 minutes by shorting the test pins. The CXM board will automatically exit test mode after 20 minutes.

CXM Troubleshooting Process Flowchart / Functional Troubleshooting Chart
The "CXM Troubleshooting Process Flowchart" is a quick overview of how to start diagnosing a suspected problem, using the fault recognition features of the CXM board. The "Functional Troubleshooting Chart" on the following page is a more comprehensive method for identifying a number of malfunctions that may occur, and is not limited to just the CXM controls. Within the chart are five columns:
- The "Fault" column describes the symptoms.
- Columns 2 and 3 identify in which mode the fault is likey to occur, heating or cooling.
- The "Possible Cause column" identifies the most likely sources of the problem.
- The "Solution" column describes what should be done to correct the problem.

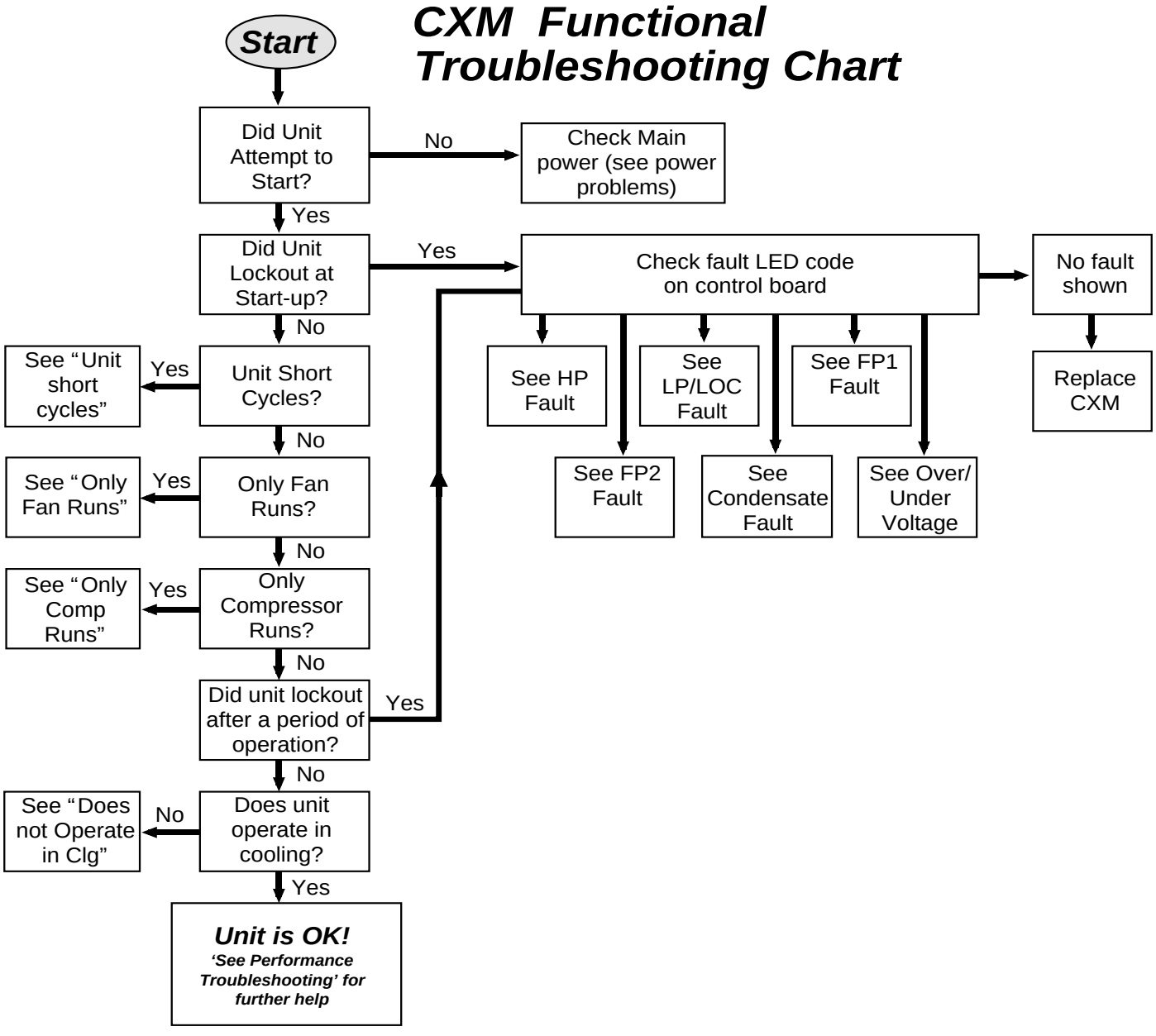
⚠ WARNING! ⚠

WARNING! HAZARDOUS VOLTAGE! DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.
Failure to disconnect power before servicing can cause severe personal injury or death.

CXM PROCESS FLOW CHART

⚠ WARNING! ⚠

WARNING! HAZARDOUS VOLTAGE! DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.
Failure to disconnect power before servicing can cause severe personal injury or death.



FUNCTIONAL TROUBLESHOOTING

Fault	Htg	Clg	Possible Cause	Solution
Main power Problems	X	X	Green Status LED Off	Check Line Voltage circuit breaker and disconnect
				Check for line voltage between L1 and L2 on the contactor
				Check for 24VAC between R and C on CXM/DXM
				Check primary/secondary voltage on transformer
HP Fault-Code 2 High pressure		X	Reduced or no water flow in cooling	Check pump operation or valve operation/setting
				Check water flow adjust to proper flow rate
		X	Water Temperature out of range in cooling	Bring water temp within design parameters
	X		Reduced or no Air flow in heating	Check for dirty air filter and clean or replace
				Check fan motor operation and airflow restrictions
				Dirty Air Coil- construction dust etc.
				Too high of external static. Check static vs blower table
	X		Air Temperature out of range in heating	Bring return air temp within design parameters
	X	X	Overcharged with refrigerant	Check superheat/subcooling vs typical operating condition table
	X	X	Bad HP Switch	Check switch continuity and operation. Replace
LP/LOC Fault-Code 3	X	X	Insufficient charge	Check for refrigerant leaks
Low Pressure/Loss of Charge	X		Compressor pump down at start-up	Check charge and start-up water flow
FP1 Fault - Code 4 Water Coil low temperature limit	X		Reduced or no water flow in heating	Check pump operation or water valve operation/setting
				Plugged strainer or filter. Clean or replace.
				Check water flow adjust to proper flow rate
	X		Inadequate anti-freeze level	Check antifreeze density with hydrometer
	X		Improper temperature limit setting (30°F vs 10°F [-1°C vs -12°C])	Clip JW3 jumper for antifreeze (10°F [-12°C]) use
	X		Water Temperature out of range	Bring water temp within design parameters
	X	X	Bad thermistor	Check temp and impedance correlation per chart
FP2 fault - Code 5 Air Coil low temperature limit		X	Reduced or no Air flow in cooling	Check for dirty air filter and clean or replace
				Check fan motor operation and airflow restrictions
				Too high of external static. Check static vs blower table
		X	Air Temperature out of range	Too much cold vent air? Bring entering air temp within design parameters
		X	Improper temperature limit setting (30°F vs 10°F [-1°C vs -12°C])	Normal airside applications will require 30°F [-1°C] only
	X	X	Bad thermistor	Check temp and impedance correlation per chart
Condensate Fault-Code 6	X	X	Blocked Drain	Check for blockage and clean drain
	X	X	Improper trap	Check trap dimensions and location ahead of vent
		X	Poor Drainage	Check for piping slope away from unit
				Check slope of unit toward outlet
				Poor venting. Check vent location
		X	Moisture on sensor	Check for moisture shorting to air coil
Over/Under Voltage-Code 7 (Auto resetting)	X	X	Under Voltage	Check power supply and 24VAC voltage before and during operation.
				Check power supply wire size
				Check compressor starting. Need hard start kit?
				Check 24VAC and unit transformer tap for correct power supply voltage
	X	X	Over Voltage	Check power supply voltage and 24VAC before and during operation.
				Check 24VAC and unit transformer tap for correct power supply voltage
Unit Performance Sentinel-Code 8	X		Heating mode FP2>125°F [52°C]	Check for poor air flow or overcharged unit.
		X	Cooling Mode FP1>125°F [52°C] OR FP2< 40°F [4°C]	Check for poor water flow, or air flow
No Fault Code Shown	X	X	No compressor operation	See "Only fan operates"
	X	X	Compressor Overload	Check and Replace if necessary
	X	X	Control board	Reset power and check operation
Unit Short Cycles	X	X	Dirty Air Filter	Check and Clean air filter
	X	X	Unit in "Test Mode"	Reset power or wait 20 minutes for auto exit.
	X	X	Unit selection	Unit may be oversized for space. Check sizing for actual load of space.
	X	X	Compressor Overload	Check and Replace if necessary
Only Fan Runs	X	X	Thermostat position	Insure thermostat set for heating or cooling operation
	X	X	Unit locked out	Check for lockout codes. Reset power.
	X	X	Compressor Overload	Check compressor overload. Replace if necessary.
	X	X	Thermostat wiring	Check thermostat wiring at heat pump. Jumper Y and R for compressor operation in test mode.

FUNCTIONAL TROUBLESHOOTING

Only Compressor Runs	X	X	Thermostat wiring	Check G wiring at heat pump. Jumper G and R for fan operation.
	X	X	Fan motor relay	Jumper G and R for fan operation. Check for Line voltage across BR contacts.
				Check fan power enable relay operation (if present)
	X	X	Fan motor	Check for line voltage at motor. Check capacitor
	X	X	Thermostat wiring	Check thermostat wiring at heat pump. Jumper Y and R for compressor operation in test mode.
Unit Doesn't Operate in Cooling		X	Reversing Valve	Set for cooling demand and check 24VAC on RV coil and at CXM/DXM board.
				If RV is stuck, run high pressure up by reducing water flow and while operating engage and disengage RV coil voltage to push valve.
		X	Thermostat setup	Check for 'O' RV setup not 'B'
		X	Thermostat wiring	Check O wiring at heat pump. Jumper O and R for RV coil 'Click'.
		X	Thermostat wiring	Put thermostat in cooling mode. Check for 24VAC on O (check between C and O); check for 24VAC on W (check between W and C). There should be voltage on O, but not on W. If voltage is present on W, thermostat may be bad or wired incorrectly.

PERFORMANCE TROUBLESHOOTING

Performance Troubleshooting	Htg	Clg	Possible Cause	Solution
Insufficient capacity/	X	X	Dirty Filter	Replace or clean
Not cooling or heating	X		Reduced or no Air flow	Check for dirty air filter and clean or replace
properly			in heating	Check fan motor operation and airflow restrictions
				Too high of external static. Check static vs blower table
		X	Reduced or no Air flow	Check for dirty air filter and clean or replace
			in cooling	Check fan motor operation and airflow restrictions
				Too high of external static. Check static vs blower table
	X	X	Leaky duct work	Check supply and return air temperatures at the unit and at distant duct registers if significantly different, duct leaks are present
	X	X	Low refrigerant charge	Check superheat and subcooling per chart
	X	X	Restricted metering device	Check superheat and subcooling per chart. Replace.
		X	Defective Reversing Valve	Perform RV touch test
	X	X	Thermostat improperly located	Check location and for air drafts behind stat
	X	X	Unit undersized	Recheck loads & sizing check sensible clg load and heat pump capacity
	X	X	Scaling in water heat exchanger	Perform Scaling check and clean if necessary
	X	X	Inlet Water too Hot or Cold	Check load, loop sizing, loop backfill, ground moisture.
High Head Pressure	X		Reduced or no Air flow	Check for dirty air filter and clean or replace
			in heating	Check fan motor operation and airflow restrictions
				Too high of external static. Check static vs blower table
		X	Reduced or no water flow	Check pump operation or valve operation/setting
			in cooling	Check water flow adjust to proper flow rate
		X	Inlet Water too Hot	Check load, loop sizing, loop backfill, ground moisture.
	X		Air Temperature out of range in heating	Bring return air temp within design parameters
		X	Scaling in water heat exchanger	Perform Scaling check and clean if necessary
	X	X	Unit Overcharged	Check superheat and subcooling. Reweigh in charge
	X	X	Non-condensables insystem	Vacuum system and reweigh in charge
	X	X	Restricted metering device	Check superheat and subcooling per chart. Replace.
Low Suction Pressure	X		Reduced water flow	Check pump operation or water valve operation/setting
			in heating	Plugged strainer or filter. Clean or replace.
				Check water flow adjust to proper flow rate
	X		Water Temperature out of range	Bring water temp within design parameters
		X	Reduced Air flow	Check for dirty air filter and clean or replace
			in cooling	Check fan motor operation and airflow restrictions
				Too high of external static. Check static vs blower table
		X	Air Temperature out of range	Too much cold vent air? Bring entering air temp within design parameters
	X	X	Insufficient charge	Check for refrigerant leaks
Low discharge air temperature in heating	X		Too high of air flow	Check fan motor speed selection and airflow chart
	X		Poor Performance	See 'Insufficient Capacity'
High humidity		X	Too high of air flow	Check fan motor speed selection and airflow chart
		X	Unit oversized	Recheck loads & sizing check sensible clg load and heat pump capacity

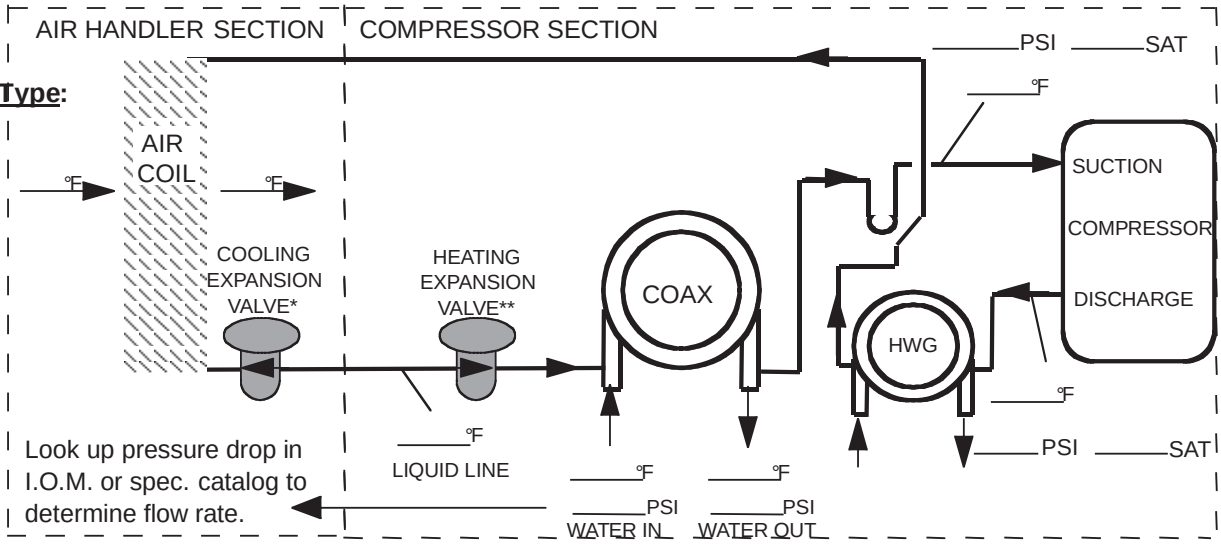
TROUBLESHOOTING FORM

Customer: _____ Antifreeze: _____

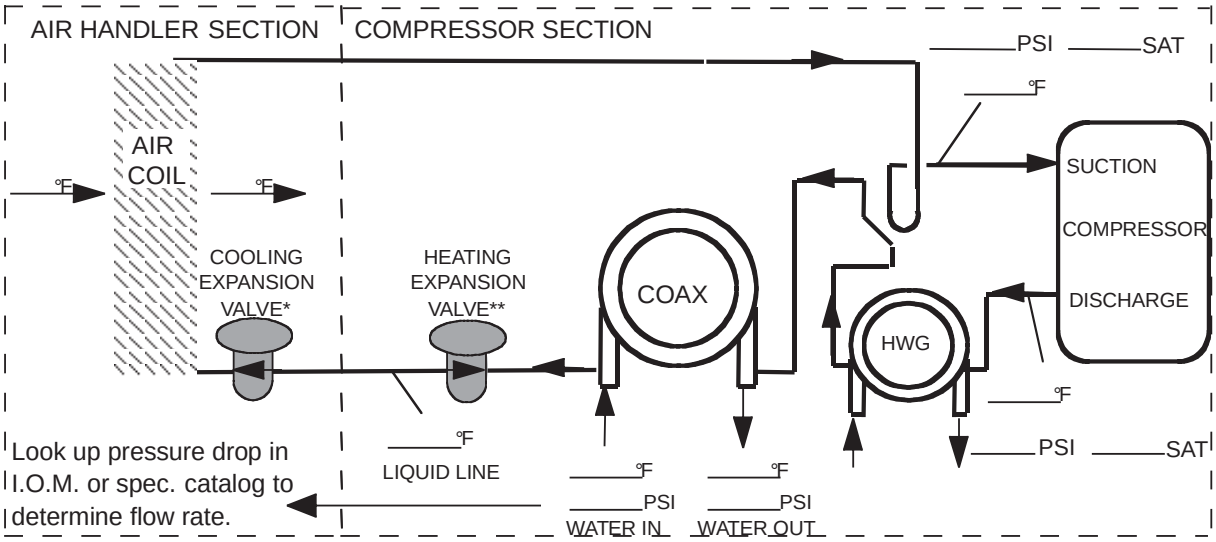
Model#: _____ Serial#: _____ Loop type: _____

Complaint: _____

HEATING CYCLE ANALYSIS -



COOLING CYCLE ANALYSIS -



Refrigerant Type:

R410A

R22

R407C

*Cooling expansion valve meters in the cooling mode, and bypasses in the heating mode.

**Heating expansion valve meters in the heating mode, and bypasses in the cooling mode.

Heat of Extraction (Absorbtion) or Heat of Rejection =

_____ flow rate (gpm) x _____ temp. diff. (deg. F) x _____ fluid factor † = _____ (Btu/hr)

Superheat = suction temperature - suction saturation temp. = _____ (deg F)

Subcooling = discharge saturation temp. - liquid line temp. = _____ (deg F)

†Use 500 for water, 485 for antifreeze.

Note: Never connect refrigerant gauges during startup procedures. Conduct water-side analysis using P/T ports to determine water flow and temperature difference. If water-side analysis shows poor performance, refrigerant troubleshooting may be required. Connect refrigerant gauges as a last resort.

MITSUBISHI ELECTRIC
HVAC Advanced Products Division

Mr. Slim System Pre-Commissioning and Installation Check List

INDOOR UNITS:						
	INDOOR UNIT # _____					REMARKS
Model No.			Unit Address:			
Serial No.						
Location						
Voltage	Line Voltage			___________________ V		
Inlet Temperature	Cooling:	_______ DB°F	Heating:	_______ DB°F		
Outlet Temperature	Cooling:	_______ DB°F	Heating:	_______ DB°F		

INDOOR UNITS:						
	INDOOR UNIT # _____					REMARKS
Model No.			Unit Address:			
Serial No.						
Location						
Voltage	Line Voltage			___________________ V		
Inlet Temperature	Cooling:	_______ DB°F	Heating:	_______ DB°F		
Outlet Temperature	Cooling:	_______ DB°F	Heating:	_______ DB°F		

INDOOR UNITS:						
	INDOOR UNIT # _____					REMARKS
Model No.			Unit Address:			
Serial No.						
Location						
Voltage	Line Voltage			___________________ V		
Inlet Temperature	Cooling:	_______ DB°F	Heating:	_______ DB°F		
Outlet Temperature	Cooling:	_______ DB°F	Heating:	_______ DB°F		

INDOOR UNITS:						
	INDOOR UNIT # _____					REMARKS
Model No.			Unit Address:			
Serial No.						
Location						
Voltage	Line Voltage			___________________ V		
Inlet Temperature	Cooling:	_______ DB°F	Heating:	_______ DB°F		
Outlet Temperature	Cooling:	_______ DB°F	Heating:	_______ DB°F		

MITSUBISHI ELECTRIC
HVAC Advanced Products Division

Mr. Slim Series System Pre-Commissioning and Installation Check List

SYSTEM:				
NO.	**SYSTEM AND INSTALLATION STATUS**			**REMARKS**
1	Installation Location	Outdoor Unit	☐ Rooftop ☐ Other Location (_____)	
2	Maintenance Accessibility	Outdoor Unit Indoor Units	☐ Good ☐ Poor ☐ Good ☐ Poor	
3	Furthest Piping Length		Outdoor to Indoor: _____ Ft.	
4	Height Difference	(Multiple Only)	Outdoor to Indoor: _____ Ft. Indoor to Indoor: _____ Ft.	
5	Standard of Pipe-work		☐ Good ☐ Poor	
6	Standard of Pipe Insulation		☐ Good ☐ Poor	
7	Connection of Main Power Source	Outdoor Unit Indoor Unit(s) Electrical Wire	☐ Good ☐ Poor ☐ Good ☐ Poor Type: _____ Size: _____	
8	Connection of Control System	Indoor – RC	☐ Good ☐ Poor	
9	Standard of Electrical Insulation		☐ Good ☐ Poor	
10	Access to Remove Electrical Covers		☐ Good ☐ Poor	
11	Control Method		☐ Wired ☐ Wireless	
12	Remote Controller Operation	Ventilation Cool / Heat Automatic	☐ Good ☐ Poor ☐ Good ☐ Poor ☐ Good ☐ Poor	
13	Connection of Options		☐ Good ☐ Poor	

OUTDOOR UNIT:						
NO.	**OUTDOOR UNIT OPERATION STATUS**					**REMARKS**
14	Outdoor Unit Details	Model No: _____		Serial No: _____		
15	Compressor Details	Model No: _____		Serial No: _____		
16	Power Source (Voltage)	L1 - N _____ V	L2 - N _____ V	L3 - N _____ V	Gnd – N _____ V	
17	Vibration / Noise	Compressor Fan	☐ Good ☐ Poor ☐ Good ☐ Poor			
18	Additional Refrigerant Charge (if applicable)			_____ Oz.		
19	Outdoor Unit Address (if multiple)			_____		

REMARKS:

MITSUBISHI ELECTRIC
HVAC Advanced Products Division

Mr. Slim System Commissioning Report

INSTALLATION DATA:

Site Address: _____

_____

State: _____ **Postal Code:** _____ **Country:** _____

Installing Contractor: _____ **Telephone:** _____

Commissioning Engineer: _____ **Mr. Slim Course Registration Number:** _____

Commissioning Date: _____

System Reference: _____ **CFC Safe Handling Registration Number:** _____

Location: _____

Warranty Number (Provided by MEUS/HVAC on receipt of commissioning data) _____ **Equipment Purchased From:** _____

Before running the system, carry out a full pre-commissioning check of the following points:

1. Refrigeration pipe work has been pressure tested and evacuated as per the pressure test and evacuation method statements on the inside cover of this commissioning booklet.
2. Correct refrigeration trim charge has been added and service valves opened.
3. All units, remote controllers and centralized controllers in the system have correct address settings prior to turning on power to the outdoor unit.
4. Power supply (source voltage) to all units must be checked prior to switching on. Once the unit has been switched on, the crankcase heater must be left on for a 12-hour period prior to start-up.
5. All condensate drain pipe work must be complete.
6. For P-Series systems, ensure that the indoor unit power supply (source voltage) isolator is switched on before the outdoor unit.

EVACUATION DETAILS:

Pressure Test Details: _____ **Evacuation Details:** _____

Test Pressure: _____ **Vacuum Period:** _____

Test Period: _____ **Vacuum Achieved:** _____

Pressure Rise Test: _____

COMMISSIONING ENGINEER'S COMMENTS AND POINTS FOR ATTENTION:

Commissioning Engineer's Signature: _____

NOTE:
Commissioning Data is to be returned to the following address within 21 days of completion to Validate Warranty and obtain Registration Number.

Mitsubishi Electric
HVAC Advanced Products Division
4505-A Newpoint Place
Lawrenceville, GA 30043

MITSUBISHI ELECTRIC
HVAC Advanced Products Division

Mr. Slim System Maintenance Sheet

CONTRACTOR'S NAME	SITE NAME	SITE NUMBER
ENGINEER'S NAME		DATE OF VISIT

INDOOR DETAILS	INDOOR UNIT #1	INDOOR UNIT #2	INDOOR UNIT #3	INDOOR UNIT #4
AREA SERVED				
MODEL NUMBER				
SERIAL NUMBER				

MAINTENANCE TASKS – INDOOR UNITS						
TASKS	**FREQUENCY**	**INDOOR #1**	**INDOOR #2**	**INDOOR #3**	**INDOOR #4**	
Clean air handling unit filters	Every Visit					
Check evaporator coil for dirt and clean as necessary	Annually					
Check drip tray for dirt and debris and check condensate pump for correct operation (if fitted)	Annually					
Check fan motor running current	Every Visit					
Check air on coil temperature in cooling	Every Visit					
Check air off coil temperature in cooling	Every Visit					
Check air on coil temperature in heating	Every Visit					
Check air off coil temperature in heating	Every Visit					
Check operation of auxiliary heaters (if fitted)	Every Visit					
MAINTENANCE TASKS – REMOTE CONTROLLER						
Indoor unit set point temperature set to	Every Visit					
Cooling Mode	Every Visit					
Heating Mode	Every Visit					
Fan Only	Every Visit					
Auto Mode	Every Visit					
Louver Swing	Every Visit					

MAINTENANCE TASKS – OUTDOOR UNIT		MODEL No.		SERIAL No.	
TASKS	**FREQUENCY**	**TICK OR RECORD READING**		**REMARKS**	
Inspect and clean heat exchanger	Every Visit				
Check for refrigerant leaks	Every Visit				
Check integrity of pipe work and lagging	Every Visit				
Check all electrical connections including mains isolator	Every Visit				
Check unit operation voltage and record	Every Visit				
Check unit operation current and record	Every Visit				
Check compressor run hours and record (P-Series only)	Every Visit				
Check discharge temperature and record	Every Visit				
Check suction temperature and record	Every Visit				
Check operation of crankcase heater	Every Visit				

Appendix F

Mitsubishi Electric recommends that the frequency of maintenance visits be no less than two per year. Frequency of maintenance may increase dependent upon the equipment's environment. Failure to maintain the system to the above minimum recommendations may result in the warranty becoming null and void.

VIRGINIA AIR DISTRIBUTORS, INC.

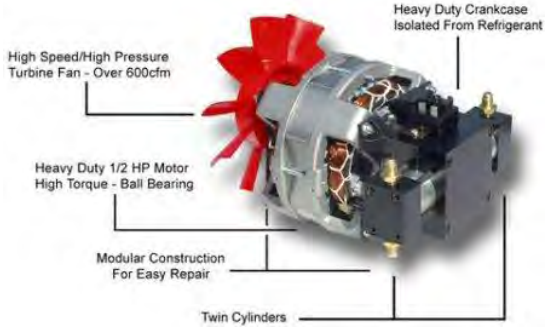
Suggested Service Truck
Start Up & Diagnostic Tool List

This list contains the minimum tools a service technician should have in order to properly start or troubleshoot a system. Properly diagnosing any system requires well maintained, trusted tools. Take note that the specific brand of tool may vary by branch. Please don't hesitate to contact your local Virginia Air branch should you have any questions or if you wish to purchase any of these items.

VIRGINIA AIR DISTRIBUTORS, INC.

G5 Twin

The G5 Twin's crankcase is completely isolated from the refrigerant flow. As a result, the main drive of the unit will last much longer too. Liquid slugging is now a thing of the past. The G5 Twin pumps vapor or liquid refrigerant without throttling. No clog prone orifices or other liquid flashing gimmicks to cause maintenance problems down the road. Just as the V8 allows automobiles to purr along, the G5's twin cylinders even out the loads while delivering greater pumping speeds for both liquid and vapor. The case is designed for maximum durability yet with a soft gripping rubber ergonomic handle. Once you experience the greater performance of the G5 Twin, single cylinder machines will be obsolete.



G5 - Twin Features

High Recovery Rates
Maximum Airflow
Twin Cylinder for Rapid Recovery
Twin Condenser for Maximum Cooling
Handles Most All Refrigerant including R410a
Lightweight - Just 24lbs.
550psi Shut Off Switch
Rugged Case with Soft Gripping Handle

Eliminator Series Vacuum Pump

DV6E Built for the Air Conditioning Serviceman who wants a high quality, dependable vacuum pump, the Eliminator Series offers many high end features without the higher end price. American made, 100% tested to JB's stringent quality standards, and backed by an unparalleled 24-month warranty, the Eliminator is the best value vacuum pump in the industry.

Features Include:

- Break resistant steel handle with cushioned cool grip
- Check valve prevents oil backflow during power failure
- 2-Stage Direct Drive achieves a deeper vacuum
- Heavy duty wide stance four point base to prevent overturning
- Brass fittings make for superior quality * Completely field repairable

Ritchie® ENGINEERING COMPANY INC.

Model: #42004

This field-proven manifold line has been expanded to include larger, easier to read color-coded gauges in rugged steel cases with polycarbonate crystals. Most importantly, these gauges feature 1% accuracy for an exact reading in critical charge systems.

Wide choice of refrigerant combinations including:

- R-22, R-134a, R-404A
- R-12, R-22, R-134a
- R-22, R-404A, R-410A
- Color-coded scales with bold, easy to read dials
- Dials with 1% accuracy (Class 1) for critical charge systems
- Proven sliding double “O” ring pistons reduce wear
- Long life nylon seats
- Forged brass body for durability
- Full porting maximizes capacity and flow
- Some models include color-coded, 60" PLUS II™ hoses with standard 1/4" flare fittings
- Hose assemblies UL recognized for 4000 psi (275 bar) burst and 800 psi (55 bar) working pressure.

VIRGINIA AIR DISTRIBUTORS, INC.

The G2 Phoenix Clamp Meter

The DL389 Pro+ offers the highest combination of functions, features, and safety offered in a meter today. Combined with The "Hook" CH3 extended clamp head, no contractor will have to compromise their safety, efficiency, or comfort.

- True RMS • Detachable clamp head
- 750V AC / 1000V DC
- 400A AC
- 2000µA AC / DC
- 40MΩ Resistance / Continuity
- 4000µF Capacitance
- -40 ~ 752°F Temperature (K type)
- Frequency / Duty Cycle
- µA for Flame Safeguard
- Non-Contact Voltage
- Diode
- MIN / MAX display
- Worklight
- Magnetic mount
- Dual display with backlight
- Test lead storage
- Test lead holder on clamp head
- Data hold
- Meter displays both **APMS** and **VOLTS** on the same screen
- Three year limited warranty

DT302

- Dual Thermocouple inputs
- Temp range -346? to +2192?F (J)
- Temp range -328? to +2498?F (K)
- Data logging
- 9,999 Memory positions
- USB interface (software included)
- Thermocouple temperature offset
- MIN, MAX, AVG & Hold
- Differential T1-T2
- Probe Storage
- 5 year limited warranty

The EM200 provides a simple, time-saving alternative to U-tube pressure measurements. Use the UEi EM200 to measure gas supply. The EM200 differential mode provides a convenient method to measure pressure drops.

- Dual input differential measurement to ±60 wg or 150 mBar
- MIN/MAX value capture
- Data hold
- Backlit display
- Ruggedized, including rubber boot with integral magnet
- Auto power-off
- One year limited warranty

The DTH31 Digital Psychrometer is an advanced handheld humidity and temperature meter. Its triple display shows three parameter readings simultaneously. It has everything you need to charge an air-conditioning system and determine heating, cooling, and ventilation needs. It gives you incredibly fast and accurate wet bulb, dry bulb, and dew point measurements.

Features

- Ambient temperature (T1)
- External temperature w/probe (T2)
- RH humidity
- Dew point
- Wet bulb
- T1 - T2
- T2 - Dew point (check difference of dew point to surface)
- Display resolution 0.1 °C / °F
- Protective sensor cap

Condensation will not affect accuracy

- Hold
- MIN/MAX
- °C or °F switchable
- Low battery indicator
- Self-calibration
- Pocket size design
- Reset
- Auto off with selectable delay
- Auto off by-pass
- One year limited warranty

VIRGINIA AIR DISTRIBUTORS, INC.

Wey-TEK Refrigerant Charging Scale

The **Wey-TEK Refrigerant Charging Scale** continues to set new standards in affordability and accuracy for refrigerant scales, enabling you to easily weigh and charge from the same large platform. Now it offers even more value, with a higher weight capacity-220 lbs., twice that of many other scales at a competitive price.
Wey-TEK is very easy to use. Its high-accuracy load cell gives the correct reading every time (no matter where the cylinder is on the weighing platform), and you can read its large LCD display at a distance, even in direct sunlight

Advanced evacuation measurement instrument providing continual digital readout of evacuation process on large 5 digit LCD. Measurement units are user selectable to read in Microns, in/hg or mBar at the touch of a key. Advanced surface mount technology automatically compensates for ambient changes in the environment ensuring accuracy and consistency in performance. Advanced field-cleanable sensor is able to withstand 400 PSI of positive pressure. Unit operates 30 hours on 9V alkaline battery with low battery indicator and auto- off feature. Includes carrying case, hanging hook, adapter fitting, 9V battery and is CE approve

Digital Vacuum Gauge